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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

DUONG, THANH P

ART UNIT PAPER NUMBER

1764

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/993,453

Applicant(s)

GOEBEL ET AL.

Examiner

Tom P Duong

Art Unit

1764

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-38 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

Applicants' remarks and amendments filed on August 5, 2004 have been carefully considered. Claims 1-2, 12, 16, and 28 have been amended. Claims 1-38 are now pending in this application.

### *Claim Objections*

In claims 9, 22, and 34, a "water spray member" should be replaced with "spray vaporization zone" to provide consistency of terminology in specification (page 16 lines 18-19).

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claim 1 is rejected under 35 U.S.C. 102(a) as being anticipated by Wheeler (6,277,509). Regarding claim 1, Wheeler discloses a fuel processor (Fig. 1) for rapidly

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achieving operating temperature, said fuel processor comprising: a reformer (64) converting a hydrogen-containing fuel to H<sub>2</sub>-containing reformat (via line 70); a shift reactor (76) in fluid communication with said reformer, said shift reactor being operable to reduce carbon monoxide levels (Col.7, lines 50-57) of said reformat; a selective oxidizer (78) constitutes a preferential oxidation reactor in fluid communication with said shift reactor, said preferential oxidation reactor being operable to further reduce carbon monoxide levels (Col. 7, lines 50-57) of said reformat exiting said shift reactor; and a first combustion heater system (58) coupled to at least one of said reformer (64), said shift reactor, and said preferential oxidation reactor, said first combustion heater system being operable in a lean state to produce thermal energy as a product of the combustion of air and fuel in the form of a first heated exhaust stream (62) that is passed through said at least on of said reformer (via line 62 & 66); said shift reactor (via line 70), and said preferential oxidation reactor (via line 77).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-9, 12, 16-22, and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maru (4,352,863) in view of Wheeler '509. Regarding claims 1, 16,

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and 28, Maru discloses a fuel processor (Figure) for rapidly achieving operating temperature, said fuel processor comprising: a reformer (9) converting a hydrogen-containing fuel to H<sub>2</sub>-containing reformat (via line 36); a shift reactor (37) in fluid communication with said reformer, said shift reactor (37) being operable to reduce carbon monoxide levels of said reformat; and a first combustion heater system (26) coupled to at least one of said reformer (9), said shift reactor, and said preferential oxidation reactor, said first combustion heater system (26) being operable in a lean state to produce thermal energy as a product of the combustion of air (28) and fuel (15) in the form of a first heated exhaust stream that is passed through said at least one of said reformer (9); said shift reactor (via line 36). Maru fails to disclose a selective oxidizer in fluid communication with said shift reactor, said preferential oxidation reactor being operable to further reduce carbon monoxide levels (Col. 7, lines 50-57) of said reformat exiting said shift reactor. Wheeler teaches the reformed fuel 70 is fed to a a preferential oxidation reactor (78) in fluid communication with the shift reactor 76 to further reduce the carbon monoxide levels prior feeding to the fuel cell 12 (Col. 7, lines 51-57). Thus, it would have been obvious in view of Wheeler to one having ordinary skill in the art to modify the fuel processor of Maru with a preferential oxidation reactor as taught by Wheeler in order to reduce the carbon monoxide levels prior to feeding to the fuel cell. Regarding claim 2, Maru discloses a second combustion heater system (41) coupled (via line 27) to at least another of said reformer (9), said shift reactor (37), and said second combustion heater system (41) being operable to produce thermal energy as a product of the combustion of air and fuel in the form of a second heated

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exhaust stream (via line 27). Regarding claims 4, 18, and 30, Maru shows the second combustion heater system (41) is positioned in series (27) with said first combustion heater system (26). Regarding claims 3, 5-6, 17, 19-20, 29, and 31-32, it is conventional to provide a fresh air stream to the combustor and it would have been obvious to do so here to control the flame temperature in the burner (See USPN 4,943, 493). Regarding claims 7, 21, and 33, Maru shows the heated exhaust stream (32) from said first combustion heater system (26) from passing through a shift reactor (37) but fails to a control valve system. However, it would have been obvious in view of Maru to one having ordinary skill in the art to provide a conventional control valve system to control amount of exhaust gas vented from the burner (26) and diverting proper amount of heated exhaust to drive the turboexpander 42 (Col. 3, lines 65-68). Regarding claim 8, Maru discloses plurality of heat exchangers (35, 16, 17, 45, 22) operatively associated with at least one of said reformer, said shift reactor, said heat exchanger being exposed to at least one of said first heated exhaust stream and said second heated exhaust stream for heating said at least one of said reformer, and said shift reactor. Regarding claims 9, 22, and 34, Maru shows a water spray member (22) coupled downstream from said second combustion heater system (41), said water spray member being operable to maintain a predetermined temperatures of said second heated exhaust stream. Regarding claim 12, Maru discloses the combustion of said air and said fuel in said first combustion heater system is lean of stoichiometric condition and said combustion of said air and said fuel in said second combustion heater system is generally near ideal stoichiometric condition (Col. 3, lines 56-60).

3. Claims 10, 23, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Maru '863 in view of Wheeler '509) as applied to claims 2, 16, and 28 above, and further in view of Okamoto et al. (6,582,841). Regarding claims 10, 23, and 35, the applied references fail to disclose a control valve system selectively routing an O<sub>2</sub>-containing cathode effluent from a fuel cell stack to a catalyst combustor and said second combustion heater system. Okamoto teaches a pressure regulator valve (26), which controls the flow rate of the exhaust air (unreacted air) from the stack to the combustor 14. Thus, it would have been obvious in view of Okamoto to one having ordinary skill in the art to modify the fuel processor of the applied references with a pressure regulator valve as taught by Okamoto in order to control the exhaust flow rate from the stack to the combustor.

4. Claims 11 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references as applied to claims 10 and 23 above, and further in view of Keskula et al. (6,159,626). Regarding claims 11 and 24, the applied references disclose all the limitations in claims 11 and 24 except a cathode back pressure valve selectively applying a fluid back pressure to facilitate routing of said O<sub>2</sub>-containing cathode effluent to said catalyst combustor. Keskula teaches a back pressure valve 47 is used to control the amount of bleed off cathode exhaust supplied to the combustor 34 and such valve applies a back pressure to allow the majority of the cathode exhaust to the combustor. Thus, it would have been obvious in view of Keskula to one having

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ordinary skill to modify the fuel processor of the applied references with a back pressure valve of Keskula to allow greater portion of the cathode exhaust to the combustor.

5. Claims 13, 15, 25, 27, 36, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Maru '863 in view of Wheeler '509) as applied to claims 2, 16, and 28 above, and further in view of Davis, Jr. et al. (4,534,165). Regarding claims 13, 25, and 36, the applied references fail to disclose a catalyst combustor positioned in series upstream from said second combustion heater system. Davis teaches the importance of staging a catalytic combustor upstream of a pilot burner (1). Such configuration provides the benefits of minimizing thermal shock to the catalyst (Col. 4, lines 1-10) and also ensures complete combustion of the fuel, which might not completely reacted in the catalytic combustor (Col. 4, lines 28-35). Thus, it would have been obvious in view of Davis to one having ordinary skill in the art to modify the fuel processor of the applied references with a catalytic combustor upstream of a burner as taught by Davis in order to gain the above benefits. Regarding claims 15, 27, and 38, the applied references fail to disclose a catalyst combustor positioned such that an output of said catalyst combustor is input downstream of said second combustion heater system. Davis teaches the importance of staging a catalytic combustor upstream of a pilot burner (1). Such configuration provides the benefits of minimizing thermal shock to the catalyst (Col. 4, lines 1-10) and also ensures complete combustion of the fuel, which might not completely reacted in the catalytic combustor



(Col. 4, lines 28-35). Thus, it would have been obvious in view of Davis to one having ordinary skill in the art to modify the fuel processor of the applied references with a catalytic combustor upstream of a burner as taught by Davis in order to gain the above benefits.

6. Claims 14, 26, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applied references (Maru '863 in view of Wheeler '509), as applied to claims 2, 16, and 28 above, and further in view of Mongia et al. (6,107,693). Regarding claims 14, 26, and 37, the applied references fail to disclose a catalyst combustor positioned in series downstream from said second combustion heater system. Mongia teaches the importance of staging a catalytic reactor part 44A in series downstream of the burner 44B, and such configuration provides the benefit of preheating the catalytic reactor part 44A during start-up. Thus, it would have been obvious in view of Mongia to one having ordinary skill in the art to modify the fuel processor of the applied references with a catalytic reactor part 44A in series downstream of the burner 44B as taught by Mongia to gain the above benefit.

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-38 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tom P Duong whose telephone number is (571) 272-2794. The examiner can normally be reached on 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tom Duong  
October 19, 2004

TD



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